

Penetration of MHD disturbances into a strongly stable outer layer caused by MHD dynamo in a rotating spherical shell

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Numerical experiments of magneto-hydrodynamic dynamo in a rotating spherical shell with a strongly stable outer layer are performed. Although the estimated values of penetration thickness of the disturbances into the stable layer proposed by Takehiro and Lister (2001) for non-magnetic cases are sufficiently small compared with the thickness of the stable layer, it is observed that vortical fluid motions and toroidal magnetic field disturbances deeply penetrate into the stable layer. These magneto-hydrodynamic disturbances in the stable layer can be interpreted as the Alfvén waves whose fluid motions are restricted in the horizontal directions. The proposed theoretical expression of propagation distance

of the Alfvén waves suggests that the numerically obtained fields permit the complete propagation of the Alfvén waves across the stable layer.

Keywords: Earth's outer core, Mercury's outer core, Dynamo, Alfvén waves